USN | | | | | | | | | |

10MN52

Fifth Semester B.E. Degree Examination, June/July 2019
Mine Environmental Engineering - I

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1 a. Calculate the percentage of various damps present in a mine which gave the following air analysis results :
$O_2 = 19.11\%$, $N_2 = 79.04\%$, $CO_2 = 0.25\%$, $CO = 0.02\%$, $CH_4 = 1.58\%$. **(10 Marks)**
   b. Explain the occurrence, detection , measurement and physiological effect of white damp.
(10 Marks)

2 a. The rate of emission of methane at a Coal face worked by a continuous miner is $0.1 m^3/S$ and that of dust production 100 billion particles per minute. Calculate the quantity of air required to be circulated to the face in order to dilute methane and the dust to a safe concentration of 0.5% and 830 PPC respectively. (General body of air , $CH_4 = 0.1\%$ and dust 200 PPC). **(10 Marks)**
   b. Explain any two types of Methane drainage with neat sketch. **(10 Marks)**

3 a. A fan ventilating a head through a duct of 600mm diameter circulates $5 m^3/s$ of air at the face. Calculate heat added to air by the fan, if input power of the fan is 4kW. **(10 Marks)**
   b. Explain the effect of humidity and heat on miner. **(10 Marks)**

4 a. Explain the factors influence economic design of mine airway. **(10 Marks)**
   b. An air tight duct 300mm dia used for ventilation is replaced by a 450mm dia one. If the length is reduced by 25% and the ventilating fan is replaced by one which generates only half the pressure, calculate the percentage increase in quantity of air delivered at the face. **(10 Marks)**

PART - B

5 a. A mine is ventilated by two shafts 500m deep. The barometer at the pit – top read 99.22 KPa and at the pit – bottom 103.92 KPa. Average temperature of air in the down cast shaft is 35^0C and average temperature of air in the up cast shaft is 39^0C. Calculate Natural Ventilating Pressure (NVP) in the mine. **(12 Marks)**
   b. How to determine the NVP by Thermodynamics principle? **(08 Marks)**

6 a. Comment on the effect of multiple fans in series and parallel with relevant graph. **(08 Marks)**
   b. Determine the Euler's Head for the centrifugal fan. **(12 Marks)**

7 a. The surface Barometer reading at a mine is 98.35 KPa at a temperature of 304K. Another barometer reading taken in the mine at the same time at a depth of 723m from the surface gives 106.26 KPa at a temperature of 309K. Calculate the ventilation pressure loss between the surface and the underground location. **(10 Marks)**
   b. Explain the process of pressure and quantity survey in underground mines. **(10 Marks)**

8 a. List the steps and objective in ventilation planning of a underground mine. **(10 Marks)**
   b. Draw the layout of ventilation in Bord and pillar and longwall method and explain the same.
(10 Marks)

*****